1. **SUBMIT TO:** Conference **SS02**

2. **CONFERENCE TITLE:** Smart Materials Technologies, **CONF. CHAIR:** Manfred Wuttig, University ofMaryland/College Park.

3. **ABSTACT TITLE:** Low-mass Muscle Actuators Using Electroactive Polymers (EAP)

4. **AUTHORS LIST: Y.** F3ar-Cohen", T. Xue[a], K. Salehpoor[b], M. Shahinpoor[b], J. Simpson[c], J. Smith', and P. Willis"

[a]Jet Propulsion Lab, California Inst. of Tech., Pasadena, CA, yosi@jpl.nasa.gov
"intelligent Materials, Structures & Systems Lab, UNM, Albuquerque, NM
[c]Composites and Polymers Branch, NASA LaRC, Hampton, VA

5. **PRESENTATION:** Oral

6. **ABSTRACT:** Electroactive materials, such as piezoelectric and electrostrictive, are increasingly being used to actuate devices for space applications. Recent NASA goals require the reduction of space mechanisms size, mass, power consumption and cost. Electroactive pol ymers (EAP) offer and attractive combination of properties to meet this goals. Under a NASA telerobotic task, EAP materials that induce large displacements arc being developed using: (a) ion-exchange membrane - platinum (IEMP)composite; and (b) electrostatically driven polymer actuators. A comparison between EAP and the widely used transducing actuators shows that, while lagging in force delivering capability, these materials arc superior in mass, power consumption and displacement levels. The material behavior, particularly that of the 1 EMP composites, arc not well documented and not fully understood. A series of electromechanical tests arc made to characterize the material to allow for accurate analytical modeling of the actuator behavior.

7. **KEY WORDS:** flexible actuators, electroactive polymers, active materials, ionomers

8. **BRIEF BIOGRAPHY: Dr. Yoseph Bar-Cohen is** the Principal Investigator for NDE and Advanced Actuators at JPL, Pasadena, CA. He is developing ultrasonic NDE methods and systems, space-worthy high torque piezoelectric motors, electroactive polymeric muscle actuators, and high power ultrasonic techniques for medical applications. Dr. Bar-Cohen received his Ph. D. in physics (1979) from the Hebrew University at Jerusalem, Israel. He has been the pioneer in developing the leaky Lamb waves and ultrasonic polar backscattering. He is the author of more than 120 publications and holds many patents. He is an Adjunct Professor at the University of California, Los Angeles (UCLA) and a Fellow of the American Society of Nondestructive Testing.